3/20

4 Parts to traditional approach to hypothesis testing (test)

① hypotheses [related to claim]
Get's the benefit of the doubt. It's assumed to be true when the test is set up.

② test statistic

③ critical region [distribution picture]

④ conclusion

A test Statistic combines stuff from the hypotheses and staff from the data

When H_0: is true, then the test statistic will follow a known distribution

$$\mu \rightarrow t$$

$$p \rightarrow Z$$

$$\theta \; \sigma^2 \rightarrow \chi^2$$

$$\frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} \sim Z \; N(0,1)$$

$$CI(p) = \hat{p} \pm Z_{\alpha/2}\sqrt{\frac{\hat{p}\hat{q}}{n}}$$

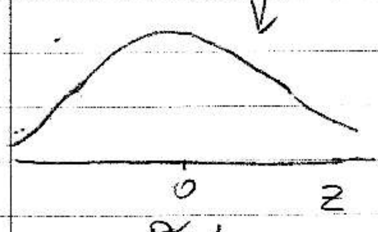
α - significance level $= P$[Tipe I Error]

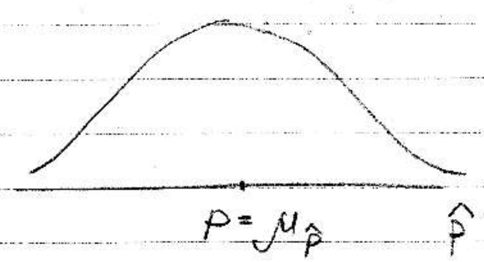
Tipe I and Tipe II Errors

		True State of Nature	
		H_o: is True	H_o: is False
We decide	reject H_o:	α = Prob. Tipe I Error	correct
	do not reject H_o:	correct	β = Prob Tipe II Error

Test statistics:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$$

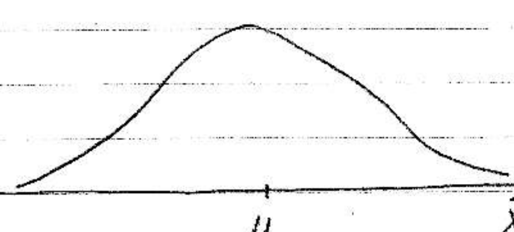




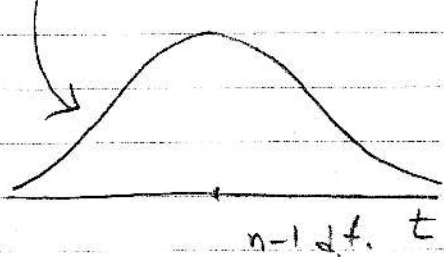
$\sqrt{\frac{pq}{n}} = \sigma_{\hat{p}}$

from all possible random samples of size $\underline{n}$

$$\frac{\bar{x} - \mu}{s/\sqrt{n}}$$



$\sigma/\sqrt{n}$



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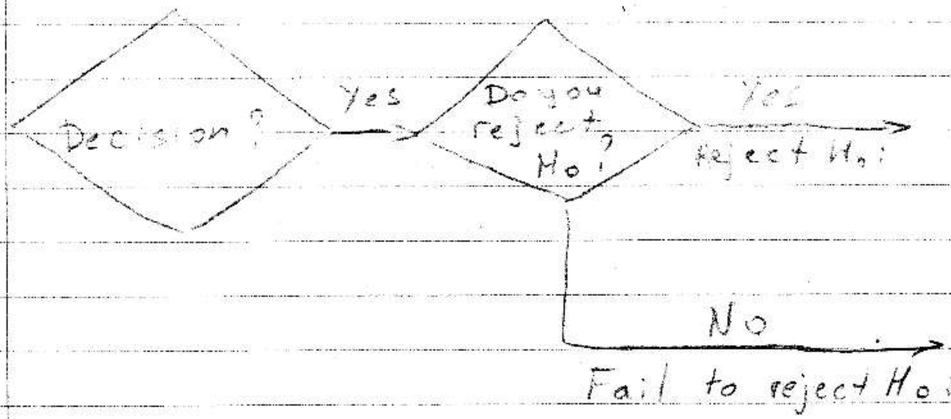


Norman Matloff
"Do not do Hypothesis Testing."

$\bar{x}$
n
s

$\bar{x} \pm t\left(\frac{s}{\sqrt{n}}\right)$

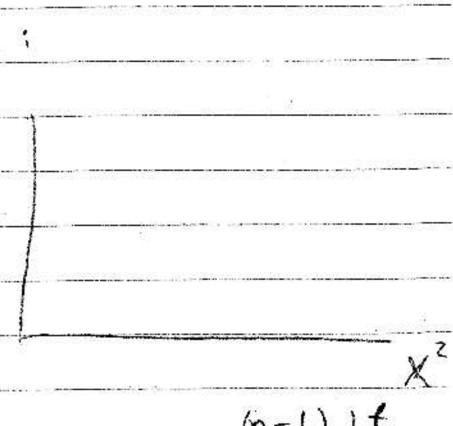
Dont do this if you have to do Hypothesis Test

Similarity	Low	High
Variability	High	Low
Uncertainty	High	Low
Reliability	Low	High

σ
or
σ^2

(idea decision proposition) Claim:
H_0 :
H_1 :
α =
test statistic :

Random sample $\frac{(n-1)s^2}{\sigma_0^2}$



Ch 6) Continuous Probability Distribution:

Uniform $x \to prob$

$prob \to x$

- Standard normal $z \to prob$

$prob \to z$

Normal $x \to z \to prob$

$prob \to z \to x$

C.L.T. $\begin{pmatrix} \bar{x} \\ s \\ n \end{pmatrix} \to z \to prob$

$prob \to z \to \begin{pmatrix} s \\ n \end{pmatrix} \to \bar{x}$

Ch 7) $CI(p) = \hat{p} \pm z_{\alpha/2}\sqrt{\frac{\hat{p}\hat{q}}{n}}$ Sample size for p

$CI(\mu) = \bar{x} \pm t_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$ Sample size for μ

$CI(\sigma)$ $\frac{(n-1)s^2}{\sigma^2} = \chi^2$

$CI(\sigma^2)$

Ch 8) Hypothesis Test

HT for p $\frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}}$

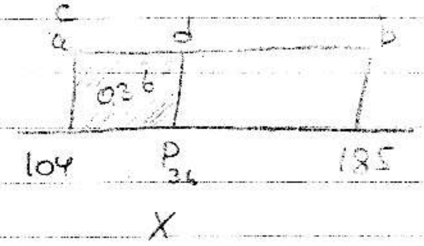
HT for μ $\frac{\bar{x} - \mu}{s/\sqrt{n}}$

HT for σ $\frac{(n-1)s^2}{\chi^2_R} < \sigma < \frac{(n-1)s^2}{\chi^2_L}$

Extra credit: Wikepedia

(2 pages only) Human height or chinook

Ex 1 $X \sim U[104, 185]$ find P_{36}



$$\frac{d-c}{b-a} = 0.36$$

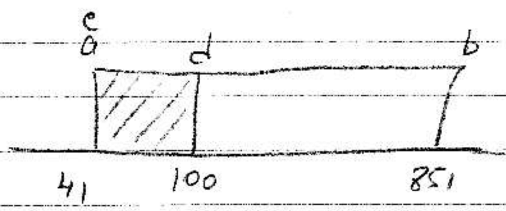
$$\frac{P_{36} - 104}{185 - 104} = 0.36$$

$P_{36} - 104 = 0.36 \cdot 81$

$P_{36} = 29.16 + 104$

$P_{36} = 133.16$

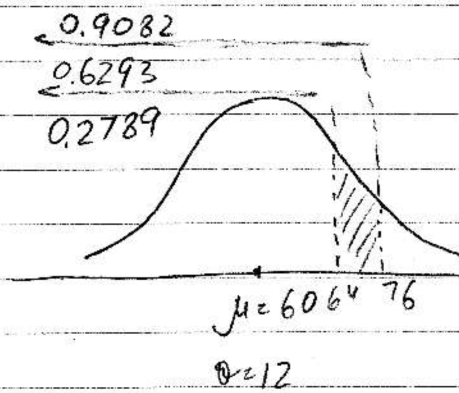
Ex 2. $X \sim U[41, 851]$



$$P(x < 100) = \frac{d-c}{b-a} =$$

$$= \frac{100-41}{851-41} = \frac{59}{810} = 0.0728$$

Ex 3 $X \sim N(60, 12)$



$$Z_1 = \frac{76-60}{12} = \frac{16}{12} = 1.33$$

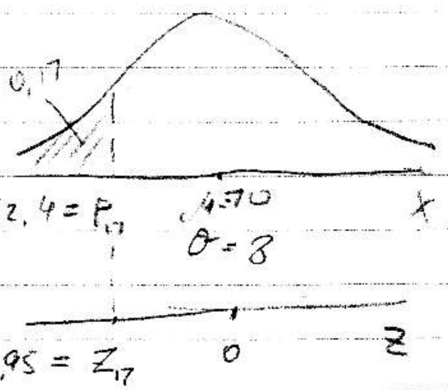
$$Z_2 = \frac{64-60}{12} = \frac{4}{12} = 0.33$$

$$Z = \frac{x - \mu}{\sigma}$$

$P(64 < x < 76) = 0.2789$

Ex 4. $X \sim N(\mu = 70,\ \sigma = 8)$

$$\frac{P_{17} - 70}{8} = Z_{17} = -0{,}95$$



$$P_{17} = (-0{,}95) \cdot 8 + 70$$

$$= 62{,}4$$

$$P_{17} = Z_{17} \cdot \sigma + \mu$$

	0,05
-0,9	$\boxed{0,17}$

0,1711